Clarifying the Role of Cooperation Networks in New Product Development (NPD)

Habibollah Salarzehi
Faculty of Management, University Of Sistan and Baluchestan, Zahedan, Iran

Maryam Rashki¹
PhD Student of Behavioral Management, University of Sistan and Baluchestan, Zahedan, Iran

Minoo Heydari
M.A of Information Technology Management, University of Sistan and Baluchistan, Zahedan, Iran

Abstract

The significant role of small and medium enterprises in the economy of developing countries has led researchers to search for ways to create efficiency and advantages for the firms in the process of economic and industrial development. Thus, new product development has always been important for managers and business owners. Given the limited funding for research and development in small and medium businesses, maintaining a competitive advantage and new product development of the network has been offered as solutions. Therefore, in this paper, it is tried to explain cooperation networks and their advantages in new product development of small and medium firms with a descriptive method and study the research carried out.

Keywords: New product development (NPD), SMEs, Cooperation Networks.

Introduction

¹Corresponding author’s email: dr.m.rashki@gmail.com
In the global economy, companies try to maintain their competitive advantage through collaboration for re-innovation in business. (Bititci, 2004). Accordingly, collaboration networks are increasingly becoming the mainstay of producers and production companies. These networks consist of various persons (real or legal) that largely operate independently of each other, in the terms of geography, they are scattered and in terms of the environment, culture, social capital elements, they are heterogeneous working together to achieve common goals. Computer networks support cooperation networks. Supply chain, virtual organizations, virtual enterprises, and human-resource planning systems are examples of cooperation networks (Durugbo, 2014. Otero, 2013).

On the other hand, the development of new products provides competitive growth opportunities and advantage for organizations around the world. Moreover, they have understood that the only way to survive today's world is to rely on the production and development of new products and the use of correct ways to improve the process of new product development to achieve success in this regard. Nowadays, with the advancement of technology, the emergence of new production equipment, organizations and businesses’ becoming more competitive, and rapid fundamental changes in the needs and demands of our customers and the like have created many problems for developing new products. Thus, many studies today try to discover the factors to guarantee the success of new product development (NPD) (Talebi, 2010). On the other hand it must be acknowledged that, although in connection with studying factors affecting new product development a great range of academic research has been carried out, these studies have not examined the small and medium companies well enough. This is while the concept of developing new product is important to the survival and growth of small and medium-sized businesses as a source of innovation and growth. (Ardekani, 2010).

Innovation potential of small and medium-sized businesses usually does not reach the emergent stage due to some specific problems related to their size. One of the basic strategies that many developing countries have used to solve this challenge is networking small and medium-sized enterprises (SME) through the formation of industrial clusters. The Internet use has given a strong capability to the organizations and small and medium-sized businesses gradually use the opportunities that the Internet has offered to them. Electronic networks are considered as powerful means to broaden and deepen SMEs activities. Nevertheless, it must be admitted that some of SMEs in developing countries still have not used the benefits of networking.

Despite over 95% of small and medium-sized production enterprises in Iran, lacking developing strategy based on industrial existing structures and leaving production small units free prevented such enterprises of significant contribution in domestic gross production and creating added value (Kamalian, 2015). But the development of small and medium-sized businesses in developing countries in recent years shows that there is a strong tendency to create a network (Radfar, 2008). Therefore, this article tries to explain the network of virtual collaboration, the importance of new product development (NPD) in small and medium-sized businesses.

**Small and medium-sized businesses**
Industries are divided into, in general, medium, small and large industries. Each country according to its own particular circumstances has presented a definition in this regard. In fact, the economic and industrial conditions prevailing in each country represent small and medium industries. These definitions are mainly divided based on quantitative measures such as number of employees, turnover rate, quality and quantity of firms. SMEs usually have three quality characteristics: unit ownership and management, individual and family ownership, and independence from other firms. These qualitative characteristics should also be considered in defining the position and function of businesses as small and midsize companies. Otherwise, only relying on quantitative measures will cause problems in implementation programs and policies related to small and medium-sized businesses (Bidokhti, 2011).

Until recently, the definition of small and medium-sized businesses was different in European countries. For example, in Germany, a company with less than 255 employees was considered a small and medium sized business and was considered average, while in Belgium the figure was 100 (Durguibo, 2014). Europe Commission (2011) decided to provide a single definition of small and medium business. With these outlook small and medium businesses was classified in three categories:

1. Micro-entities those Companies with less than 10 employees
2. Small companies that maximum number of 50 people
3. Medium-sized companies those less than 250 permanent employees

The small-scale business organizations are the ones that have between 10 and 44 employees, while the average-scale organizations have between 50 and 249 employees (Luetkenhorst, 2004). While some refer to the number of employees as criteria for determining small and medium sized businesses, others consider using capital, and others consider using a combination of investment, sales and type of industry (Dababneh, 2007).

If small businesses are going to create an effective change based on technology and innovation, they may have to revise their approach to cooperation (Xu, 2008). SMEs are now involved in networks of suppliers and customers along with their primary and secondary activities. Thus, no SME operates as an island and may not succeed alone. SMEs increasingly depend on effective cooperation with their supplier partners. Business services must be reliably and predictably provided; it is a flow of information moving back and forth among SMEs through a communication network (Kamalian, 2015). Small and medium-sized companies need to collaborate with external partners so that they can make up for other competencies and resources. This is especially important in the case of R & D, where SMEs compared to large companies face particular problems (De Toni, 2003).

**New products development (NPD)**

There are many definitions in the development of new products, some of which are mentioned below: Clark (1991) state that the development of the new product is the results of applications to create comprehensive corporate and management coordination. Wheelwright and Clark (1992) management and organizing define the activities that
enable the organizations produce effective, successful products to market with shorter development time and lower costs, as product development. Ulrich and Eppinger (2000) state that new product development is a set of activities that begins with an understanding of market opportunities and finishes by creating, selling and delivering a product. In business vocabulary developing a new product is defined as the process of developing a product or service to market. This type of development is the first step in developing a product or service that includes a series of steps that must be completed before introducing the product to market. Loch and Kavadias (2008) suggest that new product development is a series of organizational activities that lead to a stream of new or modified products that are introduced to the market over time. This may include the creation or discovery of opportunities, picking them up and making them into products (products made) and activities (services) supplied to customers, and institutionalizing improvements in new product development (Talebi, 2010). In today's world, research has changed to an economic factor, the transition from pure science has passed and scientific research institutions should clearly be at the service of economy and trade. Universities and research centers should be removed from being goals and change into a means for economic development. Now, we need to seek mechanisms that teach us the method of transforming the benefit of the idea into a product and accelerate the process of changing science into wealth. Commercialization of technology, the process of changing knowledge into products and services are very effective methods to transfer ideas from the laboratory or mind to a more widespread world (Soltani, 2010).

Figure 1. A generic stage-gate NPD process (cooper, 2002)

Cooperation Network

Network concept is examined from different perspectives: Iacobucci and Hopkins (1992) the network as a combination of a large number of actors and the pattern of relationships that connect them together. Knoke and Kuklinski (1980) network is defined as a particular structure that creates the network of relationships between a group of people and events. Emerson (1981) Business Network is defined as a particular type of network that can connect a set of two or more relationships, where each transaction is a
relationship between businesses. Therefore, Miles and Snow (1992) the definition at its simplest defines the business network as a set of connected companies. Powell (1987) see official network as a medium combining market and hierarchy knows that calls for cooperative behavior. On the other hand, cooperation literally means working together (Xu, 2008. Jordan and Michel, 2000. Huxham, 1996). This word is used when individuals and organizations cooperate to achieve a common goal. Other words used that define this condition are relationships, partnerships and alliances. Cooperation is discussed in organizations that are unable to achieve their targets. Moreover, the most complete definition for small and medium sized businesses is focusing on joint planning, collaboration and integration of the process among suppliers, customers and other participants in the supply chain. It also includes joint strategic decisions about partners, network designing (McLaren, 2000). Electronic ecosystems and virtual companies are a new solution and unforeseen opportunity, especially for small and medium enterprises (Wagner2011).

![Business Ecosystem Diagram](image)

**Figure 2. Businesses ecosystems (Albers, 2003)**

Small and medium businesses in today's competitive world, due to providing products and services, it requires rapid communications and communications technologies to adapt to new businesses in the international cooperation in the network, which under the pressure of the competitive world, products are continuously innovates and improves the quality of products available in the organization(Ale ebrahim,2010).

**Kind of Cooperation Network and role of them in new products development**
**Enterprise Resource Planning (ERP)**

The successful organizations of the twentieth century use ERP systems for the integration of business processes used within their portfolio and place great emphasis on the creation of integrated systems between organizations. With the help of this system, organizations can achieve dynamic models of business models. Enterprise Resource Planning includes long-term planning for all the available resources in the context of an organization (Shafie Nick Abadi, 2011).

Community of production and inventory control of American defines ERP as: Enterprise Resource Planning is an approach for effective planning and control of all resources required for the purpose of receiving, producing and responding to the needs of customers in manufacturing, distribution and service companies. ERP creates a comprehensive information system that is flexible and modifiable based on the computer with the help of a database that makes the integration of all processes, departments, with the aim the effective management of information and resources, instant access to the information and various sectors. The ultimate goal of using ERP is that the data is entered the system only once. In ERP, integration can be considered as both internal and external. Internal aspect of integration includes all the processes within the organization. External integration is as an integration of processes in the chain between the company and other partners. In ERP structure, one can define four categories of processes that need integration in internal and external dimensions:

- production, operations and support include processes such as production, planning material requirements, inventory management, quality assurance, evaluation of vendors and purchasing, transportation and distribution, engineering, maintenance and so on.

- Sales and Marketing: includes processes such as product management, segmentation and market selection, market research, order management, sales planning, contracts, distribution channels, pricing, after-sales service and so on.

- Financial: consists of a series of processes such as industrial accounting, profitability analysis, general ledger, cash management and receipts and payments, investments, budget deficit.

- Human Resources: consists of processes such as staff profile and training, salary, job classification, human resources planning, payment statements, travel expenses, etc (Shafie Nick Abadi,2011).

Therefore, cooperation between various sectors such as marketing, development and production is the most important factor in the timely delivery of new products to market (Linch, 2014). Therefore, human resource planning system provides the integration of all business processes in the field of new product development (NPD) business.

**Supply chain management and Customer Relationship**
Supply chain includes all activities related to the phase of the movement of goods from raw materials to final product consumer, and the data flow is associated with it. Supply chain management means integration of activities through improving chain supply relationship to achieve sustainable competitive advantage. The main purpose of activities related to supply chain management is to satisfy customer demand, so that a desired product can be delivered with the highest quality, lowest price to customers at the time required. In order to optimize the internal process chain, in the supply chain, each party shall be coordinated with the other members of the chain. Studies show that supply chain is reliable in achieving competitive advantage through improving relationships (Rezai, 2014). For supply chain management carefully examines the collaboration with suppliers and buyers in the new product development process (Mazzola, 2015). For example, it studied the relationship between the manufacturer of the wheel and the six key suppliers in new product design process. Design chain is known as the interaction between product design information, supplier and the customer. In fact, they have analyzed several ways of collaboration with suppliers and customers in the new product development (NPD) process as follows:

- Innovation source of the supplier
- Early involvement of suppliers
- Suppliers and investor participation
- Integration of suppliers
- Development of suppliers
- Customer participation

According to Kristofer (1992) the raw material supply chain, the chain (or network) is an organizations that becomes involved in the various processes and added value product that is in the front end supply chain innovation chain. In contrast, innovation providing chains (or networks) is organizations that are involved in the innovation process and not in the conversion process (production) of product (Mazzola, 2015).

Customer Relationship Management is a pluralist business paradigm that consists of people, process and technology (Chen & Popovich, 2003). The root of which is in relation-oriented marketing and information technology, whose aim is to maximize the benefits derived from the relationship with the customers (Zabalah, 2004). Customer Relation management (CRM) is a business philosophy that offers the organizational perspective in business with the customers. In other words, it refers to all the processes and technologies that organization uses to identify, select, motivate, develop, retain, and serve customers. This technology involves the implementation of a comprehensive solution that integrates people, processes and technology with a perfect relationship between all activities related to the clients to make our relationship more with all the clients. On the other hand, it can be considered as a wide and extensive dialog that involves four key elements of customer acquisition, customer retention, customer development and customer differentiation, in which customer retention is the most important element for maintaining the existing customers is about five times cheaper than
new customer acquisition. In addition, if the director of the organization discriminates between the customers in terms of taste and request, it makes acquiring new customers by suggestion of the existing customers and by enhancing new product this cycle moves on (Baghari, 2012).

**Business clusters**

Alfred Marshall introduced the concept of cooperation between the companies in 1890. He argued that the country's economic success depends on the density of very diverse business activities at the local level where local economies exist. Michael Porter argued that in dense local economy, business activities and interconnected activities can benefit from the potential technology opportunities for new markets or strengthen the competitiveness of benefit. In this way, based on local factors such as knowledge, relationships, motivation, etc. can create strong competitive advantage. Porter's has determined the concept of “business clusters” as a geographical group of interconnected companies and associated institutions in a particular field that has been marked by commonalities and complementarities (Negrușa, 2014).

![Figure 3. Cluster features](image)

Businesses working together in the industrial clusters bring about competitive advantage to cluster members and support the regional economy by sharing information and integration of similar activities (such as training, marketing and information technology). These competitive advantages are:

- Reducing the cost of each unit by providing technical services to the business cluster.
- Reducing transaction costs of companies and suppliers work together to save based on scale exercise.
• Attractive innovation

• Improved customer service such as reduced delivery time for mutual understanding of cluster members helps this process

• Improving access time to market of new products

• More bargaining power in all fields including suppliers and government (creating infrastructure, tax incentives)

• Saving against greater scale and presence in risk-free competition (Bitisi, 2004)

6- Cooperation Networks in small and medium-sized enterprises (SMEs)

One of the launched cooperation strategies by small and medium size companies, especially in developed countries, is sharing common developed technologies and using the available assets (Teece, 1986).

The aim of the cooperation between different companies and organizations is not just beginning common technology or unity of available assets, but it also includes controlling the desirable development path of these assets and technology (Camagni, 1990). Even large companies alone cannot keep up pace with changes in technology. To achieve high economic domain, sharing technical knowledge and skills seem important. Small companies reduce the risk of a particular company's gaining competitive advantage and downgrading other companies and moving them towards recession through cooperation, collaboration and venture. It also increases global competition (Storper & Harrison, 1990).

![Cooperation network of SMEs](Hugos, 2010)

Internationalization of the economy and politics has forced local governments to develop appropriate strategies for interaction among key elements of a government and business (Yanez, 2008). Co-operation network of governmental agencies refers to general agreements of state budget, through which the state research and development programs

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are undertaken, and budgets as government subsidies indirectly will help companies to start new research projects for the development and innovation in products or existing projects (Matt & Wolff, 2004).

Companies in this network can lead to supercharge innovation and product development in business dealings by communicating and interacting with downstream and upstream firms in the value chain (Rao, 2000). Intermediary institutions have various functions in innovation and new product development including telecommunications, forecasting, detection, scanning, data collection, processing, knowledge and evaluation (Howells, 2006). Research and academic institutions are as important partners in supporting innovative activities in business that in addition to providing new knowledge to business, through research activities, offers knowledge in the form of skilled labor graduated from universities offer (Deiz, 2000). The network can be used as a supplement in the absence of cooperation networks to achieve good economies and integration of different skills, technology and competence (Mancineli & Mazzamiti, 2008). External resources and capabilities that SMEs can have access to through the participation of foreign innovations can be considered as a stimulus in time of lack of innovation and negative impact of it (Cumbers et al, 2003). Based on this, creating cooperation between the SMEs and organizations in cooperation network can be bilateral grounds for innovation in new product development for organizations.

Figure 6. The role of Internal and External of cooperation network in SMEs on New product development (NPD).

Analysis and Conclusion
In this paper, the importance and types of cooperation network and its role in new product development in small and medium-sized businesses is depicted. Because small and medium businesses have a very effective role in the country's economic development, but because of limitations such as financial constraints, structural and short-term views the managers of these businesses are not able to take advantage of market opportunities. So the cluster approach as a means of cooperation between businesses was examined according to Porter's view. Porter has identified concept of "business clusters" as a geographical group of interconnected companies and associated institutions in a particular field with some commonalities and complementarities. Businesses cooperating in industrial clusters bring about competitive advantage to cluster members and support the regional economy by sharing information and integration of similar activities (such as training, marketing and information technology). But given the growing trend of globalization and increasing competition in global markets, small and medium businesses will be forced to join world markets in the coming years and to do this improving the quality of products and development of new products seems something essential. Thus, information technology plays an important role in the cooperation network. One of the most important tools of information technology that plays an important role in the integration and human resource planning is ERP system that has a significant impact on the progress and innovation of businesses. In ERP, new product development in business is provided through integrating all processes of business. Of other methods in network cooperation is the supply chain. In order to optimize the internal process chain in the supply chain, each party shall be coordinated with the other members of the chain. Studies show that supply chain management is a very good method to achieve competitive advantage by improving relations.

Research conducted in the field of new product development (NPD) has focused more on the internal structure of businesses. Accordingly, in this paper, it was tried to study the role of networks of cooperation in the development of new products. Since in our country the research has mostly focused on business clusters in the form of industrial town for small and medium-sized businesses to provide cooperation and development of these businesses, so far no good investment has happen on virtual networks, such as system planning, human resources and supply chain management. Based on this, in the article it was tried to enumerate the benefits of these methods as a good model for establishing a network of cooperation for small and medium. Therefore, future researchers are suggested to conduct studies with the following titles:

• Prioritizing networks of collaboration and their role in the new product development process

• The role of the supply chain in creating competitive advantage for small and medium-sized businesses

• Studying the barriers of virtual collaboration networks in small and medium businesses

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